

Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: STREETWORKS

Report Number: P510578

Luminaire Tested: **CST-CA10-760-722-U-T3-HSS**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510578  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2102-151-16)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 4/6/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: STREETWORKS  
Catalog Number: CST-CA10-760-722-U-T3-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (10) 2200K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 80973 lumens  
Efficiency: N/A  
Efficacy: 106.3 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B4 - U0 - G5

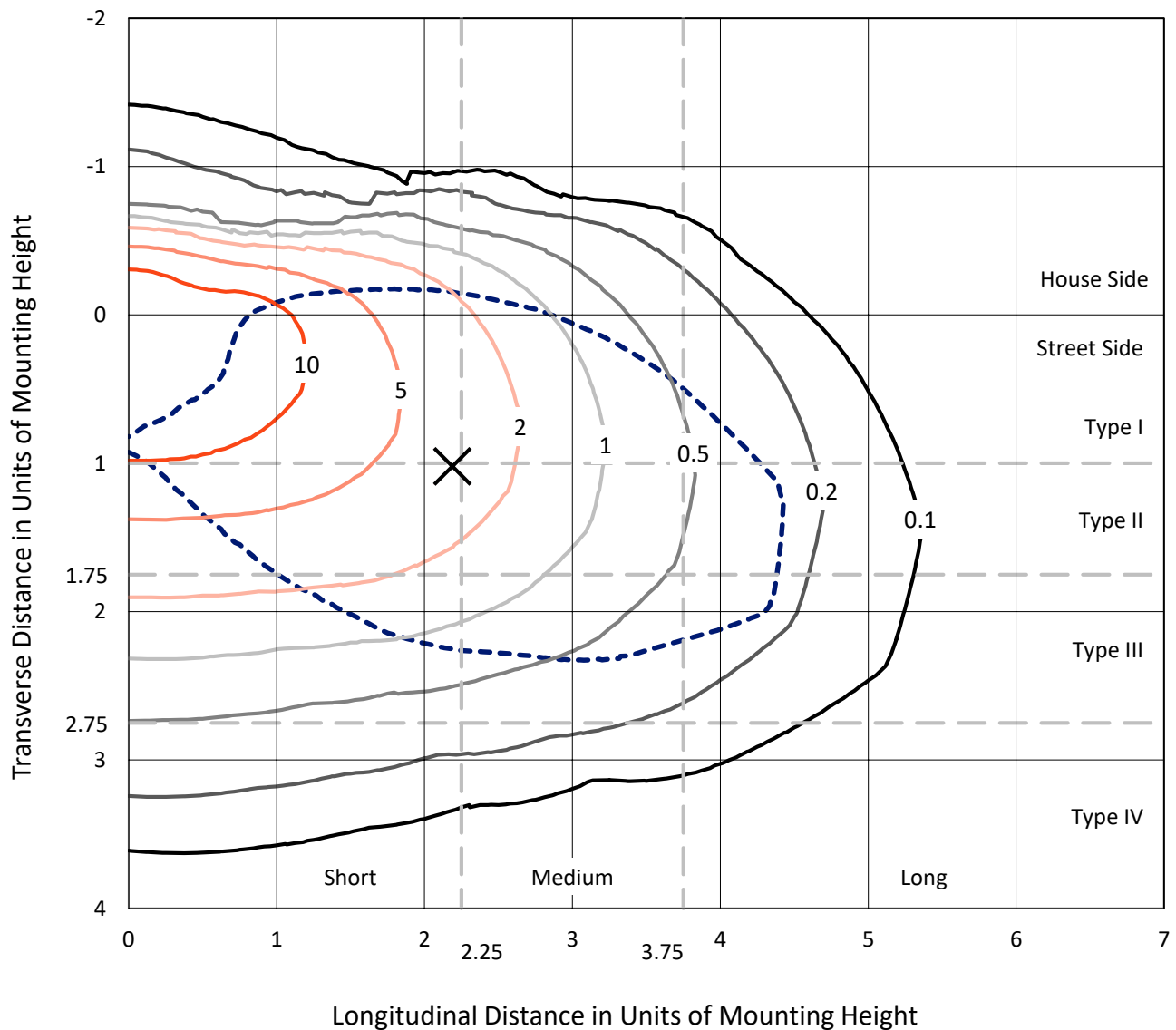
Input Watts (W): 761.9  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

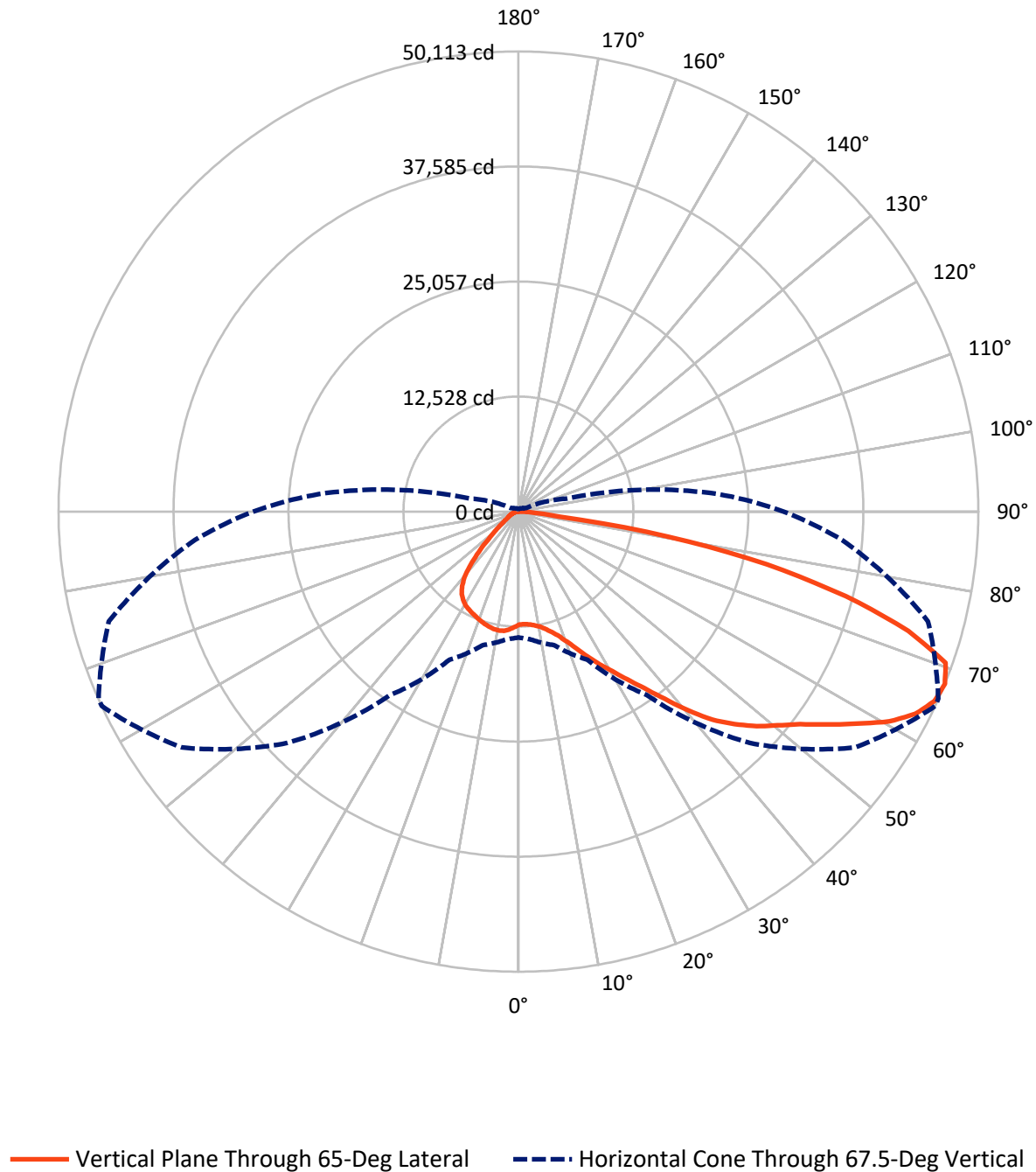
✕ Max cd  
 - - - 1/2 Max cd



Based on 30 foot mounting height. Maximum calculated value = 16.1 fc  
 Type III - Short - N/A

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## Luminous Intensity Polar Plot



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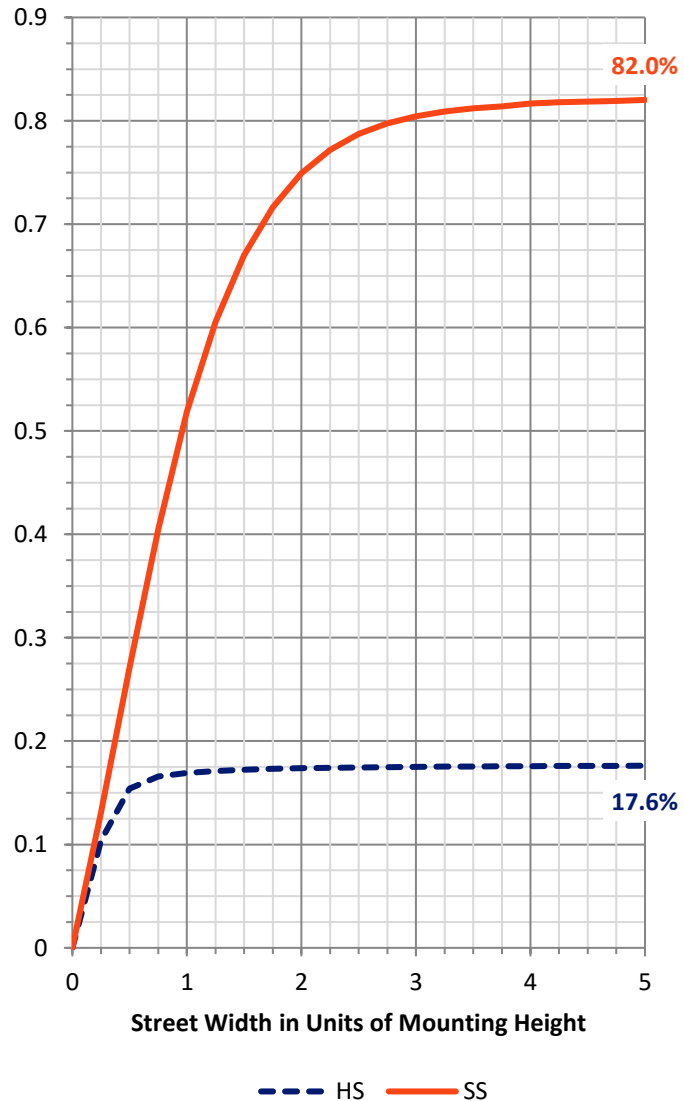
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 14471.9  | 0.0    | 14471.9 |
|                    | % Fixture | 17.9     | 0.0    | 17.9    |
| <b>Street Side</b> | Lumens    | 66501.2  | 0.0    | 66501.2 |
|                    | % Fixture | 82.1     | 0.0    | 82.1    |
| <b>Total</b>       | Lumens    | 80973.0  | 0.0    | 80973.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 1217.3  | 1.5       |
| 10°-20°   | 3758.3  | 4.6       |
| 20°-30°   | 6519.9  | 8.1       |
| 30°-40°   | 9835.1  | 12.1      |
| 40°-50°   | 13637.1 | 16.8      |
| 50°-60°   | 16833.2 | 20.8      |
| 60°-70°   | 17935.5 | 22.1      |
| 70°-80°   | 10263.0 | 12.7      |
| 80°-90°   | 973.8   | 1.2       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 80973.0 | 100.0     |
| 0°-180°   | 80973.0 | 100.0     |

**Coefficient of Utilization**



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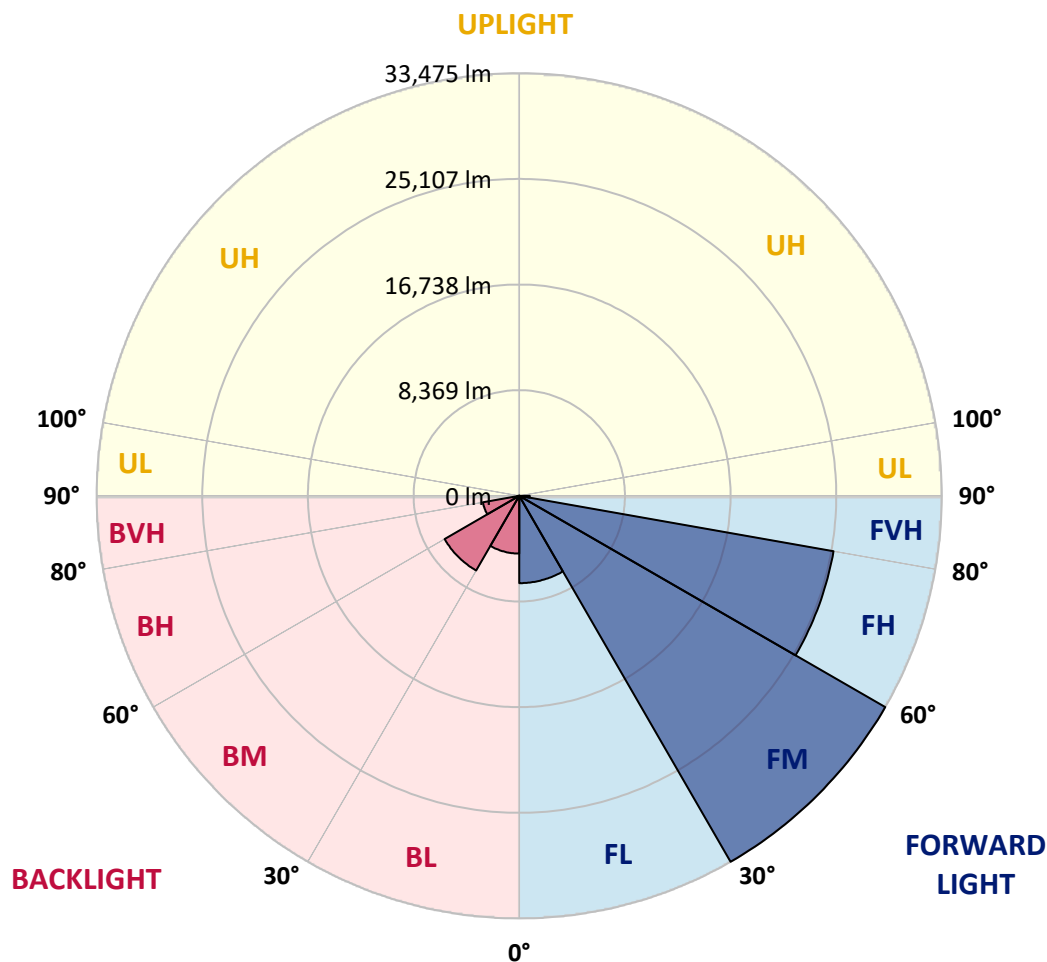
CATALOG NUMBER: CST-CA10-760-722-U-T3-HSS

**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 6916.2  | 8.5       |                         |      |         |
| FM   | (30°-60°)   | 33475.4 | 41.3      |                         |      |         |
| FH   | (60°-80°)   | 25277.5 | 31.2      |                         |      | G5      |
| FVH  | (80°-90°)   | 832.0   | 1.0       |                         |      | G5      |
| BL   | (0°-30°)    | 4579.3  | 5.7       | B4/5000                 |      |         |
| BM   | (30°-60°)   | 6830.0  | 8.4       | B4/8500                 |      |         |
| BH   | (60°-80°)   | 2920.9  | 3.6       | B4/5000                 |      | G4/5000 |
| BVH  | (80°-90°)   | 141.7   | 0.2       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B4-U0-G5**

Type III Short



FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 65°     | 66°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 |
| 2.5°  | 12185.5 | 12169.6 | 12155.4 | 12180.2 | 12194.4 | 12217.5 | 12251.2 | 12274.2 | 12281.3 | 12302.6 | 12329.2 |
| 5°    | 12380.6 | 12378.9 | 12359.4 | 12348.7 | 12318.6 | 12307.9 | 12315.0 | 12343.4 | 12345.2 | 12371.8 | 12455.1 |
| 7.5°  | 12763.8 | 12760.2 | 12712.3 | 12691.0 | 12627.2 | 12556.2 | 12503.0 | 12508.4 | 12506.6 | 12533.2 | 12644.9 |
| 10°   | 13342.0 | 13313.6 | 13246.2 | 13180.6 | 13056.4 | 12923.4 | 12825.9 | 12737.2 | 12737.2 | 12776.2 | 12900.3 |
| 12.5° | 13994.7 | 14033.8 | 13941.5 | 13842.2 | 13634.7 | 13395.2 | 13224.9 | 13125.6 | 13115.0 | 13134.5 | 13223.2 |
| 15°   | 14805.3 | 14805.3 | 14743.3 | 14601.4 | 14418.7 | 14085.2 | 13734.0 | 13608.1 | 13590.3 | 13631.1 | 13625.8 |
| 17.5° | 15718.8 | 15745.4 | 15628.3 | 15557.4 | 15277.1 | 14908.2 | 14468.3 | 14250.2 | 14250.2 | 14223.6 | 14101.2 |
| 20°   | 16884.2 | 16738.7 | 16751.1 | 16634.1 | 16428.3 | 15892.6 | 15445.7 | 15128.2 | 15124.6 | 15071.4 | 14727.3 |
| 22.5° | 18150.6 | 18070.8 | 18001.6 | 17898.7 | 17614.9 | 17136.0 | 16515.2 | 16201.3 | 16194.2 | 16062.9 | 15552.1 |
| 25°   | 19399.3 | 19459.6 | 19383.3 | 19195.3 | 18987.8 | 18466.3 | 17781.7 | 17473.0 | 17471.3 | 17253.1 | 16529.4 |
| 27.5° | 20683.5 | 20749.1 | 20724.3 | 20554.0 | 20277.3 | 19869.3 | 19221.9 | 18819.3 | 18794.5 | 18652.6 | 17742.6 |
| 30°   | 22102.5 | 22043.9 | 22120.2 | 22047.5 | 21909.1 | 21244.0 | 20658.7 | 20190.4 | 20250.7 | 20208.1 | 19120.8 |
| 32.5° | 23134.8 | 23172.0 | 23422.1 | 23429.2 | 23283.8 | 22790.7 | 22075.9 | 21788.5 | 21884.3 | 21827.5 | 20814.7 |
| 35°   | 24067.8 | 24128.1 | 24450.9 | 24768.4 | 24874.8 | 24335.6 | 23608.4 | 23590.6 | 23714.8 | 24060.7 | 23149.0 |
| 37.5° | 24869.5 | 24912.1 | 25364.4 | 25777.6 | 26121.7 | 25752.8 | 25224.2 | 25853.9 | 26036.6 | 26744.3 | 25557.7 |
| 40°   | 25350.2 | 25405.2 | 25990.5 | 26572.3 | 27186.0 | 27054.7 | 27005.1 | 28495.0 | 28667.0 | 29289.6 | 27315.5 |
| 42.5° | 25078.8 | 25187.0 | 26162.5 | 27226.8 | 28129.6 | 28392.1 | 29071.5 | 30987.1 | 31184.0 | 31237.2 | 29043.1 |
| 45°   | 24594.6 | 24729.4 | 25820.2 | 27542.5 | 29014.7 | 29857.2 | 31150.3 | 33018.0 | 33126.2 | 32975.4 | 30474.5 |
| 47.5° | 24073.1 | 24216.8 | 25435.3 | 27448.5 | 29726.0 | 31561.8 | 33007.4 | 34930.1 | 35006.4 | 34543.4 | 31916.5 |
| 50°   | 23480.7 | 23613.7 | 24924.5 | 27228.6 | 30261.6 | 33170.6 | 34915.9 | 36583.2 | 36868.8 | 35953.5 | 33037.5 |
| 52.5° | 22760.5 | 22902.4 | 24293.0 | 26884.4 | 30731.7 | 34364.3 | 36599.2 | 38451.0 | 38470.5 | 37716.6 | 34300.4 |
| 55°   | 21827.5 | 22074.1 | 23500.2 | 26288.5 | 30978.2 | 35389.5 | 38066.1 | 40921.8 | 41047.7 | 40318.7 | 35357.6 |
| 57.5° | 20789.9 | 21004.5 | 22545.9 | 25493.8 | 30756.5 | 36168.2 | 40425.1 | 43571.7 | 43555.8 | 42092.4 | 36281.7 |
| 60°   | 19418.8 | 19571.4 | 21302.5 | 24454.4 | 30041.7 | 37110.0 | 42881.7 | 46411.5 | 46383.1 | 43830.7 | 36875.9 |
| 62.5° | 17659.3 | 17811.8 | 19440.1 | 22824.4 | 28991.6 | 37741.5 | 44549.0 | 48538.2 | 48456.6 | 45095.4 | 37058.6 |
| 65°   | 15619.5 | 15892.6 | 17306.3 | 20708.3 | 27134.5 | 37326.4 | 45354.3 | 49790.4 | 49659.2 | 46060.3 | 36622.2 |
| 67.5° | 13707.4 | 13939.8 | 15059.0 | 17795.8 | 24394.1 | 35643.1 | 44786.7 | 50113.2 | 50074.2 | 46200.4 | 35389.5 |
| 70°   | 11000.7 | 11085.8 | 12111.0 | 14454.1 | 20296.8 | 32038.9 | 42825.0 | 49368.3 | 49386.0 | 44909.1 | 32913.4 |
| 72.5° | 7529.5  | 7737.0  | 8192.9  | 10042.9 | 14769.9 | 25479.7 | 36911.4 | 44430.2 | 44433.7 | 40269.0 | 28675.9 |
| 75°   | 4049.4  | 4370.5  | 4902.6  | 5819.6  | 8256.7  | 16350.3 | 29642.6 | 36867.0 | 36936.2 | 33575.0 | 22792.5 |
| 77.5° | 2007.9  | 2123.2  | 2431.8  | 3112.9  | 3785.1  | 7714.0  | 19064.1 | 27673.8 | 27838.7 | 25772.3 | 15545.0 |
| 80°   | 918.8   | 938.3   | 961.4   | 956.0   | 1449.1  | 3384.3  | 8184.0  | 16619.9 | 16669.5 | 15328.6 | 7096.7  |
| 82.5° | 718.4   | 714.8   | 725.5   | 659.8   | 663.4   | 1305.5  | 2832.6  | 4352.7  | 4641.9  | 3653.9  | 2250.9  |
| 85°   | 434.6   | 432.8   | 466.5   | 361.8   | 445.2   | 705.9   | 1429.6  | 1736.5  | 1757.8  | 1429.6  | 1165.3  |
| 87.5° | 165.0   | 159.6   | 147.2   | 129.5   | 149.0   | 198.7   | 494.9   | 638.5   | 624.4   | 443.4   | 402.6   |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



REPORT NUMBER: P510578

CATALOG NUMBER: CST-CA10-760-722-U-T3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°    | 115°    | 125°    | 135°    | 145°    | 155°    | 165°    | 175°    | 180°    |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 | 12304.4 |
| 2.5°  | 12352.3 | 12409.0 | 12513.7 | 12593.5 | 12620.1 | 12705.2 | 12786.8 | 12801.0 | 12859.6 | 12882.6 | 12958.9 |
| 5°    | 12506.6 | 12602.4 | 12765.5 | 12873.7 | 12921.6 | 13063.5 | 13155.8 | 13201.9 | 13185.9 | 13194.8 | 13279.9 |
| 7.5°  | 12731.8 | 12822.3 | 12953.6 | 13084.8 | 13107.9 | 13132.7 | 13123.8 | 13116.7 | 13054.7 | 13001.5 | 13081.3 |
| 10°   | 12937.6 | 13022.7 | 13104.3 | 13123.8 | 13006.8 | 12941.1 | 12824.1 | 12733.6 | 12613.0 | 12558.0 | 12621.9 |
| 12.5° | 13226.7 | 13244.5 | 13164.6 | 13058.2 | 12806.3 | 12572.2 | 12382.4 | 12217.5 | 12068.5 | 11965.6 | 12050.7 |
| 15°   | 13531.8 | 13462.6 | 13230.3 | 12919.9 | 12529.6 | 12194.4 | 11884.0 | 11609.1 | 11362.5 | 11302.2 | 11325.3 |
| 17.5° | 13936.2 | 13748.2 | 13279.9 | 12758.5 | 12151.8 | 11630.4 | 11231.3 | 10883.6 | 10560.8 | 10426.0 | 10413.6 |
| 20°   | 14429.3 | 14126.0 | 13381.0 | 12554.5 | 11704.9 | 11011.3 | 10394.1 | 9874.4  | 9429.2  | 9063.8  | 9072.6  |
| 22.5° | 15071.4 | 14631.5 | 13533.6 | 12341.6 | 11210.0 | 10285.9 | 9388.4  | 8505.0  | 7772.5  | 7456.8  | 7378.7  |
| 25°   | 15919.2 | 15263.0 | 13750.0 | 12148.3 | 10656.6 | 9363.5  | 8095.3  | 6848.4  | 6073.3  | 5766.4  | 5732.7  |
| 27.5° | 16974.6 | 16110.8 | 14079.9 | 11933.7 | 10064.2 | 8269.1  | 6445.7  | 5223.6  | 4512.4  | 4189.6  | 4081.4  |
| 30°   | 18173.7 | 17155.5 | 14418.7 | 11710.2 | 9347.6  | 6862.6  | 4915.0  | 3717.7  | 2988.7  | 2699.6  | 2662.4  |
| 32.5° | 19725.7 | 18478.7 | 14922.4 | 11359.0 | 8301.1  | 5393.9  | 3428.6  | 2320.0  | 1825.2  | 1701.0  | 1665.5  |
| 35°   | 21930.4 | 20268.4 | 15545.0 | 10915.5 | 6956.6  | 3767.4  | 2124.9  | 1358.7  | 1094.4  | 1032.3  | 1019.9  |
| 37.5° | 23986.2 | 22024.4 | 16172.9 | 10179.4 | 5282.2  | 2352.0  | 1215.0  | 870.9   | 812.4   | 814.1   | 817.7   |
| 40°   | 25616.2 | 23225.2 | 16680.2 | 9211.0  | 3474.7  | 1335.6  | 844.3   | 723.7   | 725.5   | 720.1   | 716.6   |
| 42.5° | 27067.1 | 24183.1 | 16909.0 | 7779.6  | 2013.2  | 894.0   | 732.6   | 666.9   | 651.0   | 656.3   | 652.7   |
| 45°   | 28268.0 | 25160.4 | 16465.5 | 6170.8  | 1186.6  | 801.7   | 691.8   | 619.0   | 601.3   | 629.7   | 633.2   |
| 47.5° | 29530.9 | 26088.0 | 15786.2 | 4649.0  | 963.1   | 762.7   | 654.5   | 583.6   | 574.7   | 610.2   | 613.7   |
| 50°   | 30593.3 | 26760.3 | 14628.0 | 3503.1  | 918.8   | 720.1   | 620.8   | 548.1   | 546.3   | 578.2   | 578.2   |
| 52.5° | 31482.0 | 27166.5 | 13253.3 | 2704.9  | 888.6   | 682.9   | 587.1   | 514.4   | 514.4   | 525.0   | 526.8   |
| 55°   | 32108.1 | 27084.9 | 12433.9 | 2128.5  | 856.7   | 647.4   | 551.6   | 482.5   | 461.2   | 454.1   | 457.6   |
| 57.5° | 32221.6 | 26868.5 | 11483.1 | 1660.2  | 819.5   | 613.7   | 519.7   | 445.2   | 406.2   | 400.9   | 399.1   |
| 60°   | 32148.9 | 26393.1 | 10397.6 | 1387.1  | 776.9   | 581.8   | 487.8   | 406.2   | 367.2   | 354.7   | 358.3   |
| 62.5° | 31845.6 | 25550.6 | 9143.6  | 1216.8  | 734.3   | 557.0   | 452.3   | 379.6   | 344.1   | 328.1   | 328.1   |
| 65°   | 30930.3 | 24344.5 | 7281.2  | 1066.0  | 681.1   | 530.3   | 423.9   | 368.9   | 329.9   | 312.2   | 308.6   |
| 67.5° | 28918.9 | 21841.7 | 5472.0  | 934.8   | 629.7   | 502.0   | 420.4   | 367.2   | 322.8   | 298.0   | 294.4   |
| 70°   | 26221.1 | 18762.5 | 3735.5  | 821.2   | 572.9   | 475.4   | 418.6   | 368.9   | 315.7   | 283.8   | 280.2   |
| 72.5° | 21889.6 | 14791.1 | 2151.5  | 714.8   | 516.2   | 450.5   | 411.5   | 370.7   | 303.3   | 264.3   | 259.0   |
| 75°   | 16447.8 | 10374.6 | 1262.9  | 613.7   | 461.2   | 413.3   | 392.0   | 360.1   | 283.8   | 241.2   | 235.9   |
| 77.5° | 9892.1  | 4844.1  | 950.7   | 509.1   | 395.5   | 363.6   | 349.4   | 329.9   | 259.0   | 223.5   | 218.2   |
| 80°   | 3629.1  | 1839.4  | 746.7   | 408.0   | 314.0   | 315.7   | 301.5   | 289.1   | 235.9   | 205.8   | 202.2   |
| 82.5° | 1582.2  | 1124.5  | 551.6   | 310.4   | 246.5   | 282.0   | 248.3   | 237.7   | 202.2   | 184.5   | 177.4   |
| 85°   | 959.6   | 670.5   | 354.7   | 211.1   | 170.3   | 191.6   | 173.8   | 182.7   | 156.1   | 145.4   | 140.1   |
| 87.5° | 317.5   | 200.4   | 157.9   | 102.9   | 85.1    | 79.8    | 78.0    | 94.0    | 88.7    | 81.6    | 81.6    |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2104-215-4

Luminaire Tested: CST-CA10-630-722-U-T3

Test Date: 04/20/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-215-4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/20/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **CST-CA10-630-722-U-T3**  
 Description: STREETWORKS HIGH MAST LUMINAIRE

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2174    | CRI (Ra): | 72.8 |      |       |
| CIE u':                   | 0.2919  | R1:       | 70.2 | R9:  | -23.3 |
| CIE v':                   | 0.5354  | R2:       | 86.8 | R10: | 71.8  |
| Duv:                      | -0.0007 | R3:       | 92.8 | R11: | 63.6  |
| CIE x:                    | 0.5067  | R4:       | 66.8 | R12: | 66.0  |
| CIE y:                    | 0.4131  | R5:       | 69.1 | R13: | 73.5  |
| CIE z:                    | 0.0802  | R6:       | 84.7 | R14: | 96.9  |
| Peak Wavelength (nm):     | 608     | R7:       | 73.2 |      |       |
| Dominant Wavelength (nm): | 587     | R8:       | 39.0 |      |       |
| Purity:                   | 76.7    |           |      |      |       |
| Rf:                       | 75.7    |           |      |      |       |
| Rg:                       | 96.7    |           |      |      |       |



### Test Conditions

Stabilization Time: 79M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/32%  
 Sphere Temperature (°C): 24.8

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| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |

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**CIE 1931 Chromaticity Diagram**



**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2200K 7-step quadrangle

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### Photopic Flux vs. Wavelength

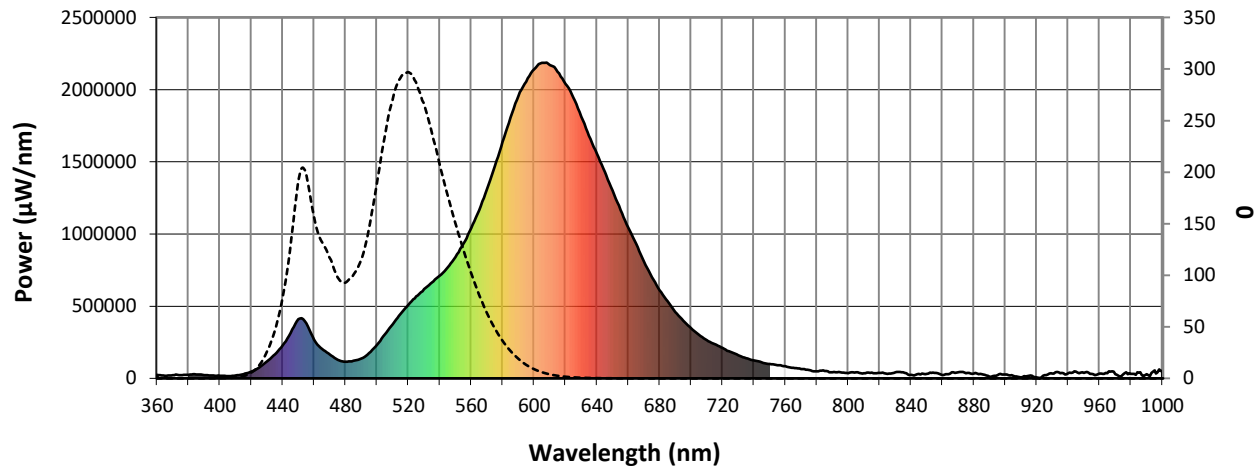


#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 23398            | 0.0              | 490       | 137099           | 19.5             | 620       | 2038916          | 530.6            | 750       | 99721            | 0.0              | 880       | 32326            | 0.0              |
| 365       | 18626            | 0.0              | 495       | 174286           | 31.6             | 625       | 1946743          | 429.5            | 755       | 91432            | 0.0              | 885       | 29783            | 0.0              |
| 370       | 21702            | 0.0              | 500       | 232711           | 51.3             | 630       | 1814508          | 328.4            | 760       | 83300            | 0.0              | 890       | 12135            | 0.0              |
| 375       | 22606            | 0.0              | 505       | 303528           | 84.9             | 635       | 1681061          | 252.6            | 765       | 72172            | 0.0              | 895       | 22953            | 0.0              |
| 380       | 25296            | 0.0              | 510       | 374456           | 128.6            | 640       | 1557170          | 186.1            | 770       | 65008            | 0.0              | 900       | 27214            | 0.0              |
| 385       | 27032            | 0.0              | 515       | 445274           | 184.5            | 645       | 1430182          | 137.7            | 775       | 56809            | 0.0              | 905       | 17038            | 0.0              |
| 390       | 22156            | 0.0              | 520       | 510296           | 247.5            | 650       | 1300435          | 95.0             | 780       | 49368            | 0.0              | 910       | 6896             | 0.0              |
| 395       | 20190            | 0.0              | 525       | 566771           | 304.3            | 655       | 1165554          | 66.9             | 785       | 51733            | 0.0              | 915       | 17142            | 0.0              |
| 400       | 18423            | 0.0              | 530       | 617892           | 363.8            | 660       | 1044122          | 43.5             | 790       | 41796            | 0.0              | 920       | 7675             | 0.0              |
| 405       | 16139            | 0.0              | 535       | 664903           | 412.3            | 665       | 932131           | 29.6             | 795       | 42601            | 0.0              | 925       | 21587            | 0.0              |
| 410       | 19812            | 0.0              | 540       | 711603           | 463.7            | 670       | 808971           | 17.7             | 800       | 36382            | 0.0              | 930       | 32992            | 0.0              |
| 415       | 29121            | 0.1              | 545       | 768835           | 511.7            | 675       | 701208           | 11.7             | 805       | 41419            | 0.0              | 935       | 35464            | 0.0              |
| 420       | 46007            | 0.1              | 550       | 841179           | 571.6            | 680       | 610741           | 7.1              | 810       | 35865            | 0.0              | 940       | 34460            | 0.0              |
| 425       | 76329            | 0.4              | 555       | 932641           | 637.0            | 685       | 533825           | 4.6              | 815       | 39722            | 0.0              | 945       | 46305            | 0.0              |
| 430       | 117696           | 0.9              | 560       | 1040487          | 707.1            | 690       | 459427           | 2.6              | 820       | 37236            | 0.0              | 950       | 38353            | 0.0              |
| 435       | 166890           | 2.0              | 565       | 1164360          | 774.2            | 695       | 399973           | 1.7              | 825       | 31566            | 0.0              | 955       | 30772            | 0.0              |
| 440       | 227762           | 3.6              | 570       | 1307677          | 850.3            | 700       | 347460           | 1.0              | 830       | 42647            | 0.0              | 960       | 32413            | 0.0              |
| 445       | 315427           | 6.6              | 575       | 1470810          | 915.2            | 705       | 302187           | 0.6              | 835       | 41433            | 0.0              | 965       | 35310            | 0.0              |
| 450       | 409560           | 10.6             | 580       | 1637734          | 973.2            | 710       | 262909           | 0.4              | 840       | 24213            | 0.0              | 970       | 28048            | 0.0              |
| 455       | 381103           | 12.8             | 585       | 1807622          | 1004.4           | 715       | 236689           | 0.3              | 845       | 31358            | 0.0              | 975       | 26258            | 0.0              |
| 460       | 269221           | 11.0             | 590       | 1958195          | 1012.4           | 720       | 209675           | 0.1              | 850       | 30957            | 0.0              | 980       | 31067            | 0.0              |
| 465       | 203513           | 10.5             | 595       | 2055425          | 974.3            | 725       | 184999           | 0.1              | 855       | 38865            | 0.0              | 985       | 40288            | 0.0              |
| 470       | 163989           | 10.2             | 600       | 2141598          | 923.0            | 730       | 160261           | 0.1              | 860       | 23238            | 0.0              | 990       | 29366            | 0.0              |
| 475       | 129159           | 10.1             | 605       | 2185430          | 846.3            | 735       | 140736           | 0.0              | 865       | 32686            | 0.0              | 995       | 54854            | 0.0              |
| 480       | 115440           | 11.0             | 610       | 2170089          | 745.5            | 740       | 125207           | 0.0              | 870       | 41855            | 0.0              | 1000      | 50994            | 0.0              |
| 485       | 120959           | 14.3             | 615       | 2123505          | 641.1            | 745       | 110736           | 0.0              | 875       | 35838            | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



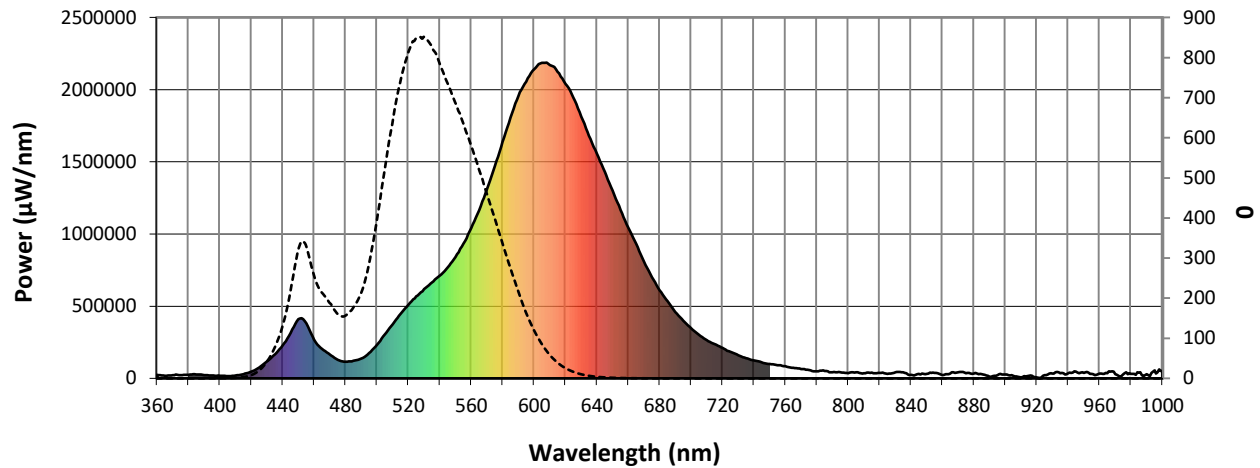
Scotopic Lumens: 72942.9

S/P: 0.88

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 23398            | 0.0              | 490       | 137099           | 211.1            | 620       | 2038916          | 25.5             | 750       | 99721            | 0.0              | 880       | 32326            | 0.0              |
| 365       | 18626            | 0.0              | 495       | 174286           | 281.7            | 625       | 1946743          | 16.4             | 755       | 91432            | 0.0              | 885       | 29783            | 0.0              |
| 370       | 21702            | 0.0              | 500       | 232711           | 389.3            | 630       | 1814508          | 10.3             | 760       | 83300            | 0.0              | 890       | 12135            | 0.0              |
| 375       | 22606            | 0.0              | 505       | 303528           | 516.0            | 635       | 1681061          | 6.4              | 765       | 72172            | 0.0              | 895       | 22953            | 0.0              |
| 380       | 25296            | 0.0              | 510       | 374456           | 634.7            | 640       | 1557170          | 4.0              | 770       | 65008            | 0.0              | 900       | 27214            | 0.0              |
| 385       | 27032            | 0.1              | 515       | 445274           | 738.0            | 645       | 1430182          | 2.4              | 775       | 56809            | 0.0              | 905       | 17038            | 0.0              |
| 390       | 22156            | 0.1              | 520       | 510296           | 811.1            | 650       | 1300435          | 1.5              | 780       | 49368            | 0.0              | 910       | 6896             | 0.0              |
| 395       | 20190            | 0.2              | 525       | 566771           | 847.9            | 655       | 1165554          | 0.9              | 785       | 51733            | 0.0              | 915       | 17142            | 0.0              |
| 400       | 18423            | 0.3              | 530       | 617892           | 851.9            | 660       | 1044122          | 0.6              | 790       | 41796            | 0.0              | 920       | 7675             | 0.0              |
| 405       | 16139            | 0.5              | 535       | 664903           | 828.5            | 665       | 932131           | 0.3              | 795       | 42601            | 0.0              | 925       | 21587            | 0.0              |
| 410       | 19812            | 1.2              | 540       | 711603           | 786.3            | 670       | 808971           | 0.2              | 800       | 36382            | 0.0              | 930       | 32992            | 0.0              |
| 415       | 29121            | 3.0              | 545       | 768835           | 737.2            | 675       | 701208           | 0.1              | 805       | 41419            | 0.0              | 935       | 35464            | 0.0              |
| 420       | 46007            | 7.6              | 550       | 841179           | 687.8            | 680       | 610741           | 0.1              | 810       | 35865            | 0.0              | 940       | 34460            | 0.0              |
| 425       | 76329            | 18.7             | 555       | 932641           | 637.4            | 685       | 533825           | 0.0              | 815       | 39722            | 0.0              | 945       | 46305            | 0.0              |
| 430       | 117696           | 40.1             | 560       | 1040487          | 581.6            | 690       | 459427           | 0.0              | 820       | 37236            | 0.0              | 950       | 38353            | 0.0              |
| 435       | 166890           | 74.6             | 565       | 1164360          | 522.4            | 695       | 399973           | 0.0              | 825       | 31566            | 0.0              | 955       | 30772            | 0.0              |
| 440       | 227762           | 127.3            | 570       | 1307677          | 461.5            | 700       | 347460           | 0.0              | 830       | 42647            | 0.0              | 960       | 32413            | 0.0              |
| 445       | 315427           | 211.2            | 575       | 1470810          | 400.6            | 705       | 302187           | 0.0              | 835       | 41433            | 0.0              | 965       | 35310            | 0.0              |
| 450       | 409560           | 317.4            | 580       | 1637734          | 337.4            | 710       | 262909           | 0.0              | 840       | 24213            | 0.0              | 970       | 28048            | 0.0              |
| 455       | 381103           | 333.0            | 585       | 1807622          | 276.3            | 715       | 236689           | 0.0              | 845       | 31358            | 0.0              | 975       | 26258            | 0.0              |
| 460       | 269221           | 260.0            | 590       | 1958195          | 218.0            | 720       | 209675           | 0.0              | 850       | 30957            | 0.0              | 980       | 31067            | 0.0              |
| 465       | 203513           | 214.9            | 595       | 2055425          | 163.9            | 725       | 184999           | 0.0              | 855       | 38865            | 0.0              | 985       | 40288            | 0.0              |
| 470       | 163989           | 188.8            | 600       | 2141598          | 120.7            | 730       | 160261           | 0.0              | 860       | 23238            | 0.0              | 990       | 29366            | 0.0              |
| 475       | 129159           | 161.5            | 605       | 2185430          | 85.9             | 735       | 140736           | 0.0              | 865       | 32686            | 0.0              | 995       | 54854            | 0.0              |
| 480       | 115440           | 155.9            | 610       | 2170089          | 58.8             | 740       | 125207           | 0.0              | 870       | 41855            | 0.0              | 1000      | 50994            | 0.0              |
| 485       | 120959           | 175.3            | 615       | 2123505          | 39.3             | 745       | 110736           | 0.0              | 875       | 35838            | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 23955.7**    **M/P: 0.29**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 23398            | 0.0              | 490       | 137099           | 114.1            | 620       | 2038916          | 1.6              | 750       | 99721            | 0.0              | 880       | 32326            | 0.0              |
| 365       | 18626            | 0.0              | 495       | 174286           | 143.9            | 625       | 1946743          | 1.0              | 755       | 91432            | 0.0              | 885       | 29783            | 0.0              |
| 370       | 21702            | 0.0              | 500       | 232711           | 187.1            | 630       | 1814508          | 0.6              | 760       | 83300            | 0.0              | 890       | 12135            | 0.0              |
| 375       | 22606            | 0.0              | 505       | 303528           | 232.9            | 635       | 1681061          | 0.4              | 765       | 72172            | 0.0              | 895       | 22953            | 0.0              |
| 380       | 25296            | 0.0              | 510       | 374456           | 268.9            | 640       | 1557170          | 0.2              | 770       | 65008            | 0.0              | 900       | 27214            | 0.0              |
| 385       | 27032            | 0.0              | 515       | 445274           | 290.9            | 645       | 1430182          | 0.2              | 775       | 56809            | 0.0              | 905       | 17038            | 0.0              |
| 390       | 22156            | 0.1              | 520       | 510296           | 297.1            | 650       | 1300435          | 0.1              | 780       | 49368            | 0.0              | 910       | 6896             | 0.0              |
| 395       | 20190            | 0.1              | 525       | 566771           | 287.4            | 655       | 1165554          | 0.1              | 785       | 51733            | 0.0              | 915       | 17142            | 0.0              |
| 400       | 18423            | 0.2              | 530       | 617892           | 267.0            | 660       | 1044122          | 0.0              | 790       | 41796            | 0.0              | 920       | 7675             | 0.0              |
| 405       | 16139            | 0.3              | 535       | 664903           | 239.3            | 665       | 932131           | 0.0              | 795       | 42601            | 0.0              | 925       | 21587            | 0.0              |
| 410       | 19812            | 0.8              | 540       | 711603           | 208.3            | 670       | 808971           | 0.0              | 800       | 36382            | 0.0              | 930       | 32992            | 0.0              |
| 415       | 29121            | 1.9              | 545       | 768835           | 178.6            | 675       | 701208           | 0.0              | 805       | 41419            | 0.0              | 935       | 35464            | 0.0              |
| 420       | 46007            | 5.3              | 550       | 841179           | 151.0            | 680       | 610741           | 0.0              | 810       | 35865            | 0.0              | 940       | 34460            | 0.0              |
| 425       | 76329            | 11.9             | 555       | 932641           | 125.8            | 685       | 533825           | 0.0              | 815       | 39722            | 0.0              | 945       | 46305            | 0.0              |
| 430       | 117696           | 24.9             | 560       | 1040487          | 102.6            | 690       | 459427           | 0.0              | 820       | 37236            | 0.0              | 950       | 38353            | 0.0              |
| 435       | 166890           | 44.5             | 565       | 1164360          | 81.7             | 695       | 399973           | 0.0              | 825       | 31566            | 0.0              | 955       | 30772            | 0.0              |
| 440       | 227762           | 76.1             | 570       | 1307677          | 63.9             | 700       | 347460           | 0.0              | 830       | 42647            | 0.0              | 960       | 32413            | 0.0              |
| 445       | 315427           | 124.4            | 575       | 1470810          | 49.0             | 705       | 302187           | 0.0              | 835       | 41433            | 0.0              | 965       | 35310            | 0.0              |
| 450       | 409560           | 188.7            | 580       | 1637734          | 36.6             | 710       | 262909           | 0.0              | 840       | 24213            | 0.0              | 970       | 28048            | 0.0              |
| 455       | 381103           | 199.7            | 585       | 1807622          | 26.9             | 715       | 236689           | 0.0              | 845       | 31358            | 0.0              | 975       | 26258            | 0.0              |
| 460       | 269221           | 158.6            | 590       | 1958195          | 19.2             | 720       | 209675           | 0.0              | 850       | 30957            | 0.0              | 980       | 31067            | 0.0              |
| 465       | 203513           | 133.0            | 595       | 2055425          | 13.2             | 725       | 184999           | 0.0              | 855       | 38865            | 0.0              | 985       | 40288            | 0.0              |
| 470       | 163989           | 117.4            | 600       | 2141598          | 9.0              | 730       | 160261           | 0.0              | 860       | 23238            | 0.0              | 990       | 29366            | 0.0              |
| 475       | 129159           | 98.6             | 605       | 2185430          | 6.0              | 735       | 140736           | 0.0              | 865       | 32686            | 0.0              | 995       | 54854            | 0.0              |
| 480       | 115440           | 92.8             | 610       | 2170089          | 3.9              | 740       | 125207           | 0.0              | 870       | 41855            | 0.0              | 1000      | 50994            | 0.0              |
| 485       | 120959           | 99.7             | 615       | 2123505          | 2.5              | 745       | 110736           | 0.0              | 875       | 35838            | 0.0              |           |                  |                  |

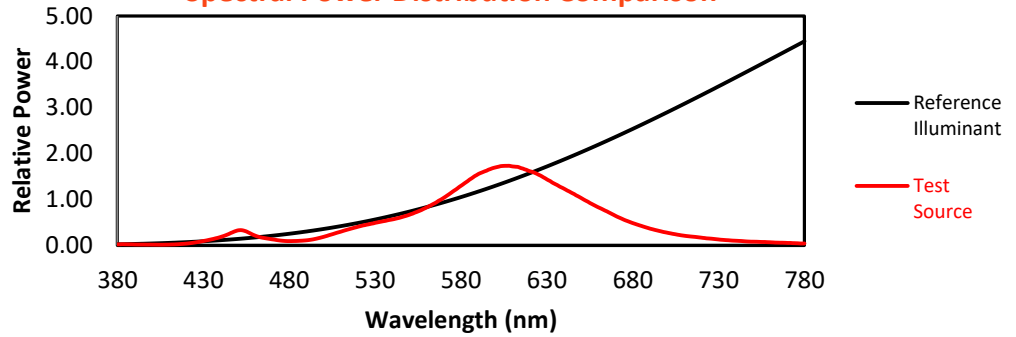
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TM-30-18

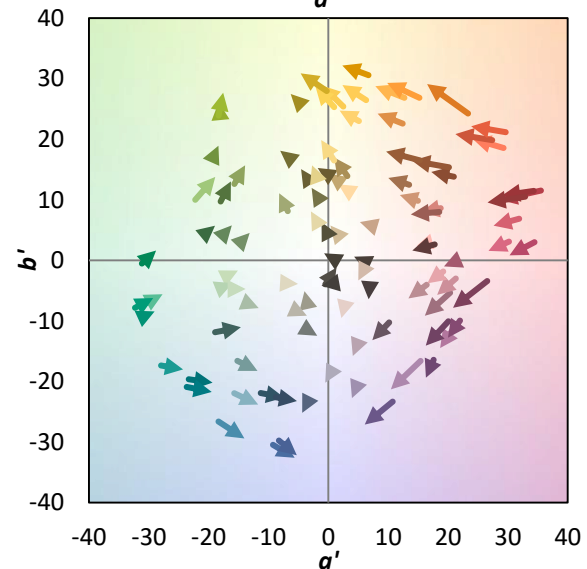
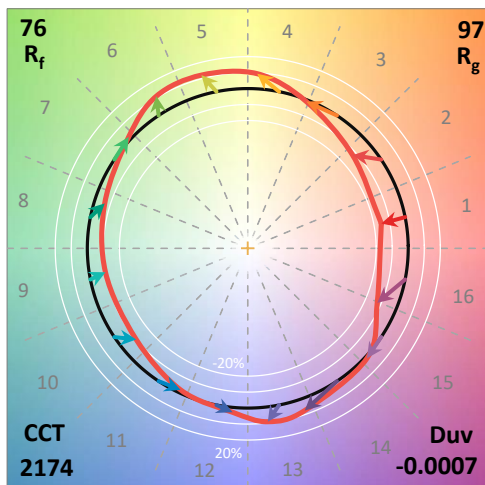
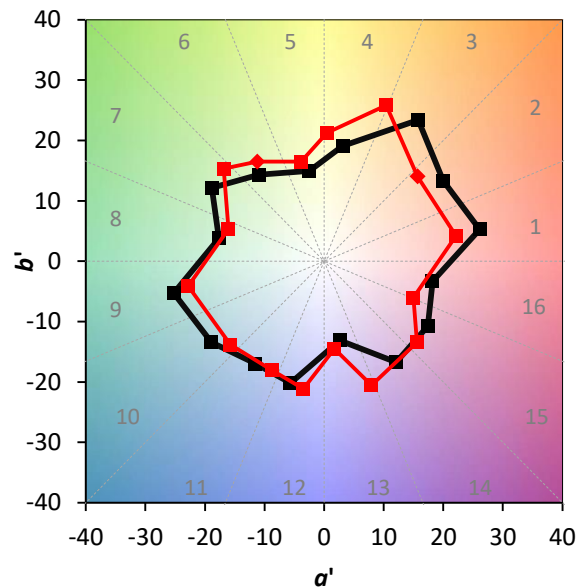
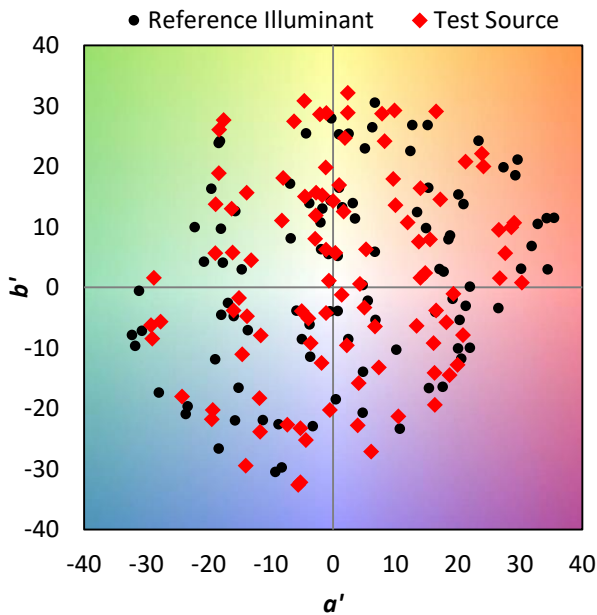
### Summary

$R_f = 75.7$   
 $R_g = 96.7$   
 CIE  $R_a = 72.8$   
 $R_g = -23.3$

### Spectral Power Distribution Comparison



### Color Vector Graphics

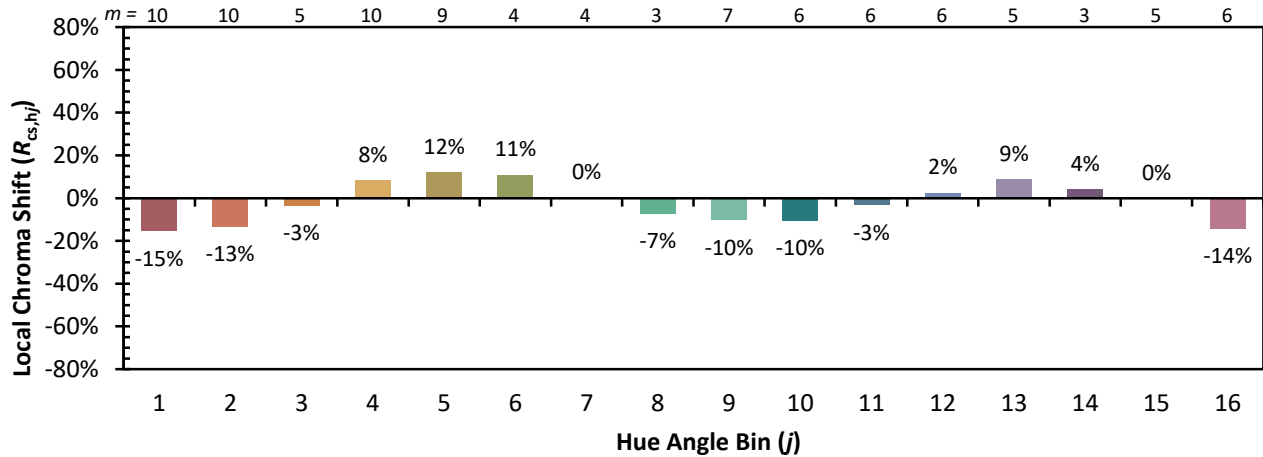


Individual Sample Fidelity Index ( $R_{f,i}$ )

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 68 | CES51 = 84 | CES76 = 70 |
| CES02 = 65 | CES27 = 88 | CES52 = 83 | CES77 = 79 |
| CES03 = 32 | CES28 = 89 | CES53 = 77 | CES78 = 73 |
| CES04 = 72 | CES29 = 66 | CES54 = 87 | CES79 = 85 |
| CES05 = 52 | CES30 = 75 | CES55 = 85 | CES80 = 84 |
| CES06 = 53 | CES31 = 69 | CES56 = 76 | CES81 = 57 |
| CES07 = 44 | CES32 = 65 | CES57 = 75 | CES82 = 93 |
| CES08 = 43 | CES33 = 73 | CES58 = 78 | CES83 = 87 |
| CES09 = 29 | CES34 = 81 | CES59 = 86 | CES84 = 92 |
| CES10 = 79 | CES35 = 91 | CES60 = 94 | CES85 = 72 |
| CES11 = 62 | CES36 = 96 | CES61 = 85 | CES86 = 52 |
| CES12 = 68 | CES37 = 90 | CES62 = 92 | CES87 = 78 |
| CES13 = 45 | CES38 = 81 | CES63 = 78 | CES88 = 77 |
| CES14 = 75 | CES39 = 94 | CES64 = 73 | CES89 = 62 |
| CES15 = 72 | CES40 = 90 | CES65 = 71 | CES90 = 77 |
| CES16 = 49 | CES41 = 86 | CES66 = 71 | CES91 = 91 |
| CES17 = 51 | CES42 = 87 | CES67 = 69 | CES92 = 60 |
| CES18 = 57 | CES43 = 74 | CES68 = 74 | CES93 = 74 |
| CES19 = 74 | CES44 = 99 | CES69 = 85 | CES94 = 49 |
| CES20 = 69 | CES45 = 81 | CES70 = 70 | CES95 = 71 |
| CES21 = 89 | CES46 = 76 | CES71 = 72 | CES96 = 77 |
| CES22 = 81 | CES47 = 77 | CES72 = 89 | CES97 = 79 |
| CES23 = 92 | CES48 = 66 | CES73 = 64 | CES98 = 75 |
| CES24 = 92 | CES49 = 75 | CES74 = 87 | CES99 = 67 |
| CES25 = 74 | CES50 = 84 | CES75 = 75 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)